DEVELOPMENT OF WIRELESS DATA TRANSMISSION USING 8051 MICROCONTROLLER

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This thesis is submitted as partial fulfillment of the requirements for the award of the Bachelor Degree of Electrical Engineering (Electronics)

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APRIL, 2006

"I hereby acknowledge that the scope and quality of this thesis is qualified for the award of the Bachelor Degree of Electrical Engineering (Electronics)"

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To my beloved father and mother

ACKNOWLEDGEMENT

Alhamdulillah, I’m grateful to the creator Allah S.W.T because of His regards I finally finish this final year project. Without His blessing it is difficult for me to overcome and face all problems while completing this project. I also would like to express thousand of thank to my supervisor, Mr Md. Rizal B. Othman who give highly encouragement, supporting and guideline in order to finish this task.

Not forgetting to my beloved parents that always prays for me and give me strength with unlimited effort. They always remind and give lots of motivation about patient and ask me to never give up. Thank you mum and dad, may Allah bless you always.

Beside that, thank you very much to my entire friend who always share ideas and co-operation in order to finish this project. I wish you all best of luck.

Lastly, thank you for those who are involved directly or indirectly and your co-operation will never be forgotten.

ABSTRACT

As a human being we sometime in habit of lost an item such as keys, TV remote and so on. So we need devices that have ability searching to the lost item and save our time. By doing a research, I have found a device which meets this specification. Development board of wireless data transmission can be used to solve this matter. This board also can be used for other application such as to control the thing located in a small place which is difficult to us to enter as well as it can be used to control something located in a danger place such as ultraviolet wave. For trial, I do implement this board to locate and item. The main part of this board is microcontroller and interface with keypad and LCD display together with the requirement of radio frequency .The keypad is used to enter the names of the item and select the item. The user can then select the desired item and press the button to transmit the RF. The LCD will then will display the name of the item according to the key being pressed in keypad. Overall, this project consist of both hardware and software design. The microcontroller plays an important role to control the overall system design.

ABSTRAK

Sebagai manusia biasa, kita kadang kala mempunyai suatu habit kehilangan barang seperti kunci, alat kawalan tv dan sebagainya. Disebabkan oleh itu, kita memerlukan sejenis alat yang boleh membantu kita mencari barang yang hilang dan menjimatkan masa. Berdasarkan kajian yang telah dibuat, saya telah menjumpai sejenis alat yang menepati ciri-ciri yang telah dinyatakan. Alat penghantar data tanpa wayar boleh digunakan bagi mengatasi masalah ini. Walau bagaimanapun, alat ini juga boleh digunakan untuk aplikasi lain seperti untuk mengawal sesuatu yang berada di suatu tempat yang susah dicapai oleh manusia atau untuk mengawal sesuatu yang berada di kawasan merbahaya seperti radioaktif. Sebagai percubaan, alat ini digunakan untuk mencari objek yang hilang. Penghantaran data tanpa wayar ini dikawal oleh sejenis alat kawalan-mikro dan disambungkan kepada pad kekunci dan pemancar LCD bersama-sama dengan radio frekuensi. Pad kekunci digunakan untuk menyimpan nama-nama barang yang hilang, memilih barang yang hendak dicari dan menyimpan nombor ID barang yang hendak dicari. Apabila, pengguna ingin mencari barang yang hilang, mereka hanya perlu menekan “alert button” supaya signal radio frekuensi dapat dihantar. Pemancar LCD akan memancarkan nama-nama barang yang hendak dicari berdasarkan kekunci yang ditekan pada pad kekunci. Secara keseluruhannya, projek ini terdiri daripada dua bahagian utama iaitu alatan dan perisian. Alat pengawal-mikro memainkan peranan penting untuk mengawal keseluruhan system ini.

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LIST OF ABBREVIATION

RF	**Radio Frequency**
LCD	**Liquid Crystal Display**
TV	**Television**
CPU	**Central Processing Unit**
ROM	**Read Only Memory**
RAM	**Random Access Memory**
EPROM	**Erasable Programmable Read Only Memory**
DPTR	**Data Pointer**
I/O	**Input/Output**
SP	**Stack Pointer**
LSB	**Least Significant Bit**
MSB	**Most Significant Bit**

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CHAPTER1

INTRODUCTION

1.1 Background

The idea behind this project is to build a development board of wireless data transmission by using 8051 microcontroller. There are various type of microcontroller. The 8051 microcontroller originally developed by Intel in 1980. The purpose of choosing 8051 microcontroller is, it is the world's most popular microcontroller core, become the industry standard for embedded control and made by many independent manufacturers (truly multi-sourced), so it can easily get in the market. It is also simple and has enough features to meet with this project.

Wireless data transmissions are widely used in modern technology. The signal or data being transmitted wirelessly by mean of radio frequency. The data can be transmitting in several ranges depending on the frequency of radio frequency being used. There are many applications using RF such as object tracking, access control, remote control and so on. The development of wireless data transmission which I build can be use for such application for future.

1.2 Objective:

The main objectives of this project are to:

1. Build hardware design for development of wireless data transmission using microcontroller 8051 interface with LCD screen and keypad

2. Write an assembly language to program the system

1.3 Scope

These devise can operate over very long distances depending on the designation of radio frequency being used. For trial I decide to use ultra high frequency which has range frequency of 300MHz to 3GHz and able to transmit signal about 1m to 100mm. Notes that the greater the frequency the smaller the distance.

This project consists of two parts, hardware and software. The hardware is microcontroller based interfacing with LCD and keypad while the software part will writing by using an assembly language.

1.4 Problem statement

As I mention earlier that one of the application of wireless data transmissions using radio frequency is object tracking. We need a device which can help us finding an item if we are in the habit of often misplacing small items around us. We need the device that saves our precious time to find the lost item. Development of wireless data transmission using which I develop can be used to solve this matter.

I believe that this project will help and benefit to those people that have multiple items in their home that tend to get lost on a regular basis. They will no longer have to spend time searching their household or other items that are used and misplaced regularly. This device will end the frustration of having to search one's home repeatedly for lost items.

CHAPTER 2

LITERATURE REVIEWS

This chapter describe about the primary and the secondary source which I refer in order to complete this project. I have found in the internet sources the same project which is designed by Steve Yessa from Bradley University College of Engineering and Technology, Department of Electrical and Computer Engineering. It be my main source since his project consist of microcontroller,keypad, LCD and Radio Frequency. Actually this project is not going to solve the problem, but more on a study about the microcontroller and how it work, also how to interface it with some other device such as keypad and LCD display and finally study about the application of the radio frequency in daily life. In his final report, he did not describe more on keypad and LCD interface, so to get the information I have to refer to the several reference books.

2.1 Microcontroller

Microcontroller is a general purpose device, but one that is meant to read data, performs limited calculations on that data, and control its environment based on those calculations. The prime use of a microcontroller is to control the operation of a system using a fixed program that is stored in ROM and that does not change over the lifetime of the system. The detail explanation about microcontroller will be described in the next chapter.

2.2 Keypad Interface

Interfaces to keypads are common for microcontroller-based design. Keypad input is an economical choice for a user interface and often adequate for complex applications. The detail explanation will be described in the next chapter.

2.3 LCD display Interface

LCD can be add in any application in term of providing a useful interface for the user, debugging an application or just giving it a professional look. Using this interface is often not attempted by inexperience of the designer because it is difficult to find good documentation on the interface, initializing the interface can be problem and the display themselves are expensive. Further information about LCD module described in next chapter.

2.4 Radio Frequency

Radio frequency is the best idea to be used to transmit data or signal my mean of wireless transmission. The signal can be transmit in different range depending on the frequency being used by the user. It is widely used in modern technology such as in object tracking, access control and so on.

CHAPTER 3

METHODOLOGY

3.1 Introduction

In Methodology topic, I describe about the method being used in order to finish this project as well as the component needed. These projects follow the step as listed below.

i. Project Identification
ii. System Planning
iii. System Analysis
iv. System Design
v. System Implementation
vi. Troubleshooting

3.2 Project Identification

Resources such as from a journal, reference book and internet are the first thing should be done in order to go further and completing this project. All the data and information regarding to this project can be easily get from the primary source. From the research state that wireless data transmission are widely used in modern technology.It can be aply in may area including object tracking,access control and so on.

As a human being,sometime we tend to lost an item such as key, remote tv and etc. As a solution for this matter, the lost item can be found easily by using RF tansmission . However, as I do mention earlier, finding object is just one of the application of RF transmission. It can be used in other application by mean of wireless transmission.

3.3 System Planning

The purpose of the planning phase is to identify clearly the scope of this project. It is also to detect the weakness and lack of the project development which is needed to troubleshoot. This phase is one of the important parts because it involve with time to develop both hardware and software. It is about how to manage the time efficiently. For that particular, Gantt chart is used to organize planning for overall process and activity that will followed, refer on appendices A.

3.4 System Analysis

The purpose of the system analysis phase is to understand the requirement and features of the project for both hardware and software design. Figure 3.4(a) show the four major steps to fulfill system analysis.

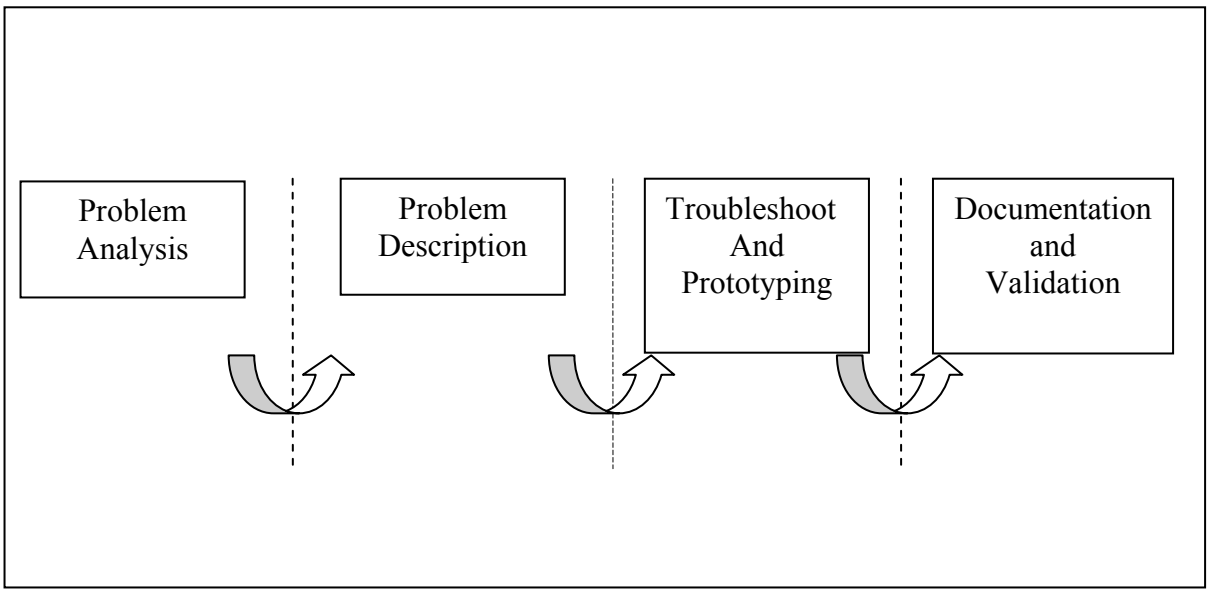

Figure 3.4: System Analysis Phase

3.4.1 Hardware Requirements

The hardware requirement on this project refers to the several of electronic components, devices and tools. There are electronic devices that it's recommended to use which is suitable. Electronic components requirements for the development of wireless data transmission are listed below:

i. Microcontroller
ii. Keypad
iii. LCD Display
iv. Buffer
v. Keypad Encoder
vi. Decoder
vii. Latch
viii. MAX233
ix. NAND gate
x. External RAM
xi. EPROM
xii. AND gate
xiii. Resistor